EPA's Proposed Clean Power Plan: Conversion to Mass-Based Emission Targets

March 17, 2015

Congressional Research Service
https://crsreports.congress.gov
R43942

CRS REPORT
Prepared for Members and
Committees of Congress

Summary

The Environmental Protection Agency (EPA) proposed a rule in June 2014 that would require states to address carbon dioxide (CO_2) emissions from existing fossil fuel-fired electric generating units. The proposal would create CO_2 emission rate goals—measured in pounds of CO_2 emissions per megawatt-hour (MWh) of electricity generation—for each state to achieve by 2030 and an interim goal in 2029, based on the average of a state's emission rates between 2020 and 2029.

EPA's proposal would allow a state to establish its emission reduction requirements by converting the interim (2029) and final (2030) emission rate targets to mass-based targets—measured in metric tons of CO_2. A state might consider using a mass-based target for a variety of reasons, including the opportunity to link with existing mass-based programs or to continue existing, state emission reduction goals. In addition, this report indicates that the mass-based reduction requirements may be less stringent in some states than the emission rate requirements.

In November 2014, EPA provided technical information to help states with this conversion process. Converting to a mass-based target requires an estimate of electricity generation in future years (i.e., 2020-2029). EPA's November 2014 support document provides two possible approaches for creating such estimates. With each approach, EPA prepared state-specific mass-based targets, which, according to EPA, "could be considered equivalent to the proposed rate-based goals."

The first approach uses (1) 2012 baseline data—emissions and electricity generation—for each state's fossil fuel fleet and (2) specific results from parts of the emission rate methodology to calculate future electricity generation. The second approach is based on both historical emissions from existing sources and projected emissions from new, fossil fuel-fired electricity generation sources. To project emissions from new sources, EPA applied specific regional growth factors prepared by the Energy Information Administration.

This report compares the required percentage reductions (between the 2012 baseline and 2030 targets) using the emission rate targets to the percentage reductions using the mass-based targets (approach 1). As with the emission rate reduction requirements, the mass-based reduction targets vary by state. For the majority of states, the percentage reductions required by the emission rates match those required by the mass-based approach. However, the required reductions differ in some cases.

This report examines the reasons for these differences. For example, in nine states the differences relate to EPA's treatment of natural gas combined cycle (NGCC) units that are under construction. In EPA's mass-based conversion methodology, the agency includes under-construction NGCC units in the 2012 fossil fuel-fired generation baseline. However, in the emission rate methodology the generation from these units is not included in the 2012 baseline. This leads to different percentage reduction requirements. In four other states, the differences are related to EPA's treatment of renewable energy in its emission rate methodology.

In addition, this report compares the percentage reduction requirements resulting from mass-based approaches 1 and 2. As one might expect, all of the states have lower percentage reduction requirements in approach 2 than in approach 1, because approach 2 includes projected increases in electricity generation. However, the range of requirements varies considerably. Several factors may explain this outcome. For instance, the regional growth factors used to project electricity demand in future years vary significantly—from 0.29% in the Northeast region to 1.31% in the Southwest region. In addition, EPA uses electricity sales data in 2012 to calculate future electricity demand, and the sales data contain electricity generation from all sources, including

hydroelectric power. Including hydroelectric power appears to have a substantial impact in states that use it to generate a significant percentage of their electricity.

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Introduction

In June 2014, the Environmental Protection Agency (EPA) published a proposed rule that would require states to address carbon dioxide (CO_2) emissions from existing fossil fuel-fired electric generating units.[1] The proposal relies on authority asserted by EPA in Section 111(d) of the Clean Air Act (CAA).[2] However, many have questioned various aspects of EPA's proposed rule, including the agency's statutory authority to issue the rule pursuant to Section 111(d).[3] In addition, the proposed rule has received considerable attention from Congress, state officials, and a range of stakeholder groups.

The proposal creates CO_2 emission rate goals—measured in pounds of CO_2 emissions per megawatt-hour (MWh) of electricity generation—for each state to achieve by 2030 and an interim goal in 2029, based on the average of a state's emission rates between 2020 and 2029. EPA's goals include potential emission reduction opportunities that are considered "outside the fence" of fossil fuel-fired generating facilities. These include increased renewable energy generation[4] and energy efficiency improvements. Thus, the emission rate goals effectively apply to a state's overall electricity generation portfolio, not just the fossil fuel units. EPA estimates that if the states achieve their individual emission rate goals, the 2030 CO_2 emissions from the electric power sector in the United States would be reduced by 30% compared to 2005 levels.

Although EPA's proposed rule measures state compliance in terms of a CO_2 emissions rate, EPA allows states considerable flexibility in terms of meeting its emissions rate goals. In particular, EPA's proposed rule would allow states to meet their compliance obligations by converting their emission rate targets to mass-based targets—measured in metric tons of CO_2.[5] When EPA issued its proposal, the agency published a technical support document ("Projecting EGU CO_2 Emission Performance in State Plans") that provided one option for converting from rate-based to mass-based targets. After receiving feedback from states about the conversion process, EPA provided additional information in November 2014,[6] including a new technical support document: "Translation of the Clean Power Plan Emission Rate-Based CO_2 Goals to Mass-Based Equivalents."

This report discusses EPA's mass-based conversion methodology and the resulting state-specific mass-based targets. The state-specific targets and percentage reduction requirements are provided

[1] U.S. EPA, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units," Proposed Rule, 79 *Federal Register* 34830, June 18, 2014.

[2] 42 U.S.C. §7411(d).

[3] For further discussion of EPA's proposal, see <CrsProductRef includeAuthors="true" productCode="R43572" prodVerID="436366" title="EPA's Proposed Greenhouse Gas Regulations for Existing Power Plants: Frequently Asked Questions" url="http://www.crs.gov/pages/Reports.aspx?PRODCODE=R43572" />CRS Report R43572, *EPA's Proposed Greenhouse Gas Regulations for Existing Power Plants: Frequently Asked Questions*, by James E. McCarthy et al.

[4] EPA proposed two options for quantifying renewable energy targets. In addition, the agency is considering different mechanisms to account for renewable energy produced in one state, but consumed in another state. See U.S. EPA, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units," Notice of data availability, 79 Federal Register 64534, October 30, 2014.

[5] Although EPA's emission rates are in pounds per megawatt-hour, most national and international measures of CO_2 emissions are provided in metric tons. One metric ton is approximately 2,205 pounds.

[6] U.S. EPA, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Generating Units," Notice of additional information, 79 *Federal Register* 67406, November 13, 2014.

in **Table 1**, allowing the states to compare their compliance obligations. A state might consider using a mass-based target for a variety of reasons, including the opportunity to link with existing mass-based programs (e.g., the Regional Greenhouse Gas Initiative)[7] or to continue existing, state emission reduction goals. This report indicates that the mass-based reduction requirements may be less stringent in some states than the emission rate requirements. Thus, some states may factor such a comparison into their decision process.

The first section of this report provides an overview of the emission rate methodology, which plays a role in the mass-based conversion calculations. The second section describes EPA's mass-based conversion methodologies: approach 1, which includes existing sources of electricity, and approach 2, which includes existing and new sources of electricity. The final section provides some observations about the results of the mass-based conversions, including a comparison of the required percentage reductions to the percentage reductions from the emission rate formula.

This report complements two other CRS reports:

1. CRS Report R43572, *EPA's Proposed Greenhouse Gas Regulations for Existing Power Plants: Frequently Asked Questions*, by James E. McCarthy et al. This report discusses a range of issues—legal, historical, and procedural—regarding EPA's proposed rule.
2. CRS Report R43652, *State CO2 Emission Rate Goals in EPA's Proposed Rule for Existing Power Plants*, by Jonathan L. Ramseur. This report discusses in detail EPA's emission rate methodology (i.e., the "building blocks") and the state-specific emission rates that result from EPA's calculations.

Overview of EPA's Emission Rate Methodology

EPA's emission rate methodology plays a critical role in the agency's mass-based conversion calculations. An overview of the emission rate formula is helpful in understanding EPA's mass-based conversion calculations.

EPA determined emission rate goals by first calculating each state's 2012 emission rate baseline, which is generally each state's portfolio of electricity generation in 2012. The resulting baselines in each state vary considerably, reflecting, among other things, the different energy sources used to generate electricity in each state. Next, EPA applied four "building blocks" to the state baselines. The building blocks involve estimates of various opportunities for states to decrease their emission rates:

- Building block 1: Coal-fired power plant efficiency improvements, such as operation and maintenance best practices and equipment upgrades;
- Building block 2: Natural gas combined cycle (NGCC) displacement of more carbon-intensive sources of electricity, particularly coal-fired generation;
- Building block 3: Increased use of renewable energy and preservation of existing and under-construction nuclear power; and
- Building block 4: Energy efficiency improvements, which result in decreased electricity generation.

[7] See CRS Report R41836, *The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Policy Makers*, by Jonathan L. Ramseur.

Although EPA used the building blocks to create state-specific emission rates, the agency would not require states to precisely implement the activities EPA used in the building blocks. States may choose to meet their emission rate goals by focusing on one or more of the building block strategies (e.g., increase renewable energy beyond building block 3 expectations) or through alternative methods.[8] For further details about EPA's emission rate methodology and state-specific results, see CRS Report R43652, *State CO2 Emission Rate Goals in EPA's Proposed Rule for Existing Power Plants*, by Jonathan L. Ramseur.

Conversion to Mass-Based Targets

EPA's November 2014 support document describes two approaches states could use to convert their emission rate targets to mass-based targets. EPA states that the approaches "are illustrations of two potential options that implementing authorities may choose to adopt if they choose to use a mass-based form of the emission rate-based goal." With each approach, EPA prepared state-specific mass-based targets, which, according to EPA, "could be considered equivalent to the proposed rate-based goals."

The first approach is generally based on historical (2012) emissions from existing sources. The second is based on historical emissions from existing and new sources.

The basic formula for converting from an emission rate to a mass-based target is the following:

CO_2 mass-based target	=	**CO_2 emission rate target**	x	**Electricity generation**
(pounds or metric tons)		(pounds per MWh)		(MWh)

The state-specific CO_2 emission rate targets in the above formula are included in EPA's June 2014 proposed rule. To convert a rate target to a mass-based target, a state would need an annual estimate of its electricity generation in future years (i.e., 2020-2029). EPA's November 2014 support document provides two methodologies that the agency used to calculate these electricity generation estimates. These methodologies are discussed below.[9]

Approach 1: Existing Sources

EPA's first mass-based conversion approach uses (1) the 2012 baseline data—emissions and electricity generation—for each state's fossil fuel fleet and (2) specific results from parts of the emission rate building blocks to calculate future electricity generation. EPA's conversion methodology includes several steps. The example provided below demonstrates how EPA projected the state-specific electricity generation levels for 2029.[10]

i. EPA determined the electricity generation from "affected electric generating units" in 2012; in general, an "affected EGU" is a fossil fuel-fired unit that was in operation or had commenced construction as of January 8, 2014, has a generating capacity above a certain

[8] EPA discusses several alternative options in its proposed rule. These include the construction of new NGCC units, nuclear power generating units, or hydroelectric power plants, and employing carbon capture and storage technology at existing fossil fuel units.

[9] EPA's November 2014 technical support document describes these steps in greater detail, using Ohio as an example. See EPA, Translation of the Clean Power Plan Emission Rate-Based CO_2 Goals to Mass-Based Equivalents, at http://www2.epa.gov/sites/production/files/2014-11/documents/20141106tsd-rate-to-mass.pdf.

[10] Both the final emission rate targets and final mass-based targets (i.e., 2030) are the same as the 2029 targets.

threshold, and sells a certain amount of its electricity generation to the grid;[11] this value serves as the electricity generation baseline; EPA used the same data that were provided with the emission rate methodology supporting materials;[12]

ii. EPA adjusted the fossil-fuel electricity generation baseline by subtracting the estimated, *incremental* generation from renewable energy in 2029 (building block 3), the under-construction nuclear power (building block 3), and reduced generation from energy efficiency for 2029 (building block 4);[13] EPA refers to this value as the "adjusted affected fossil fuel generation";[14]

iii. EPA combined the adjusted affected fossil fuel generation value (for 2029) with the estimated generation from renewable energy (both existing in 2012 and incremental in 2029), at-risk and under-construction nuclear generation, and avoided generation from energy efficiency activities (for 2029); EPA refers to this value as the "mass equivalent generation level" for 2029.

In its supporting technical materials, EPA calculated the mass equivalent generation levels for each year between 2020 and 2029. The agency then multiplied these electricity generation values by the corresponding emission rate values (from the June 2014 proposed rule) to produce state-specific, mass-based, emission targets for each year. **Table 1** lists each state's 2012 CO_2 emission baseline, 2030 CO_2 emission target, and the percentage reduction required to meet the 2030 target.

Approach 2: Existing and New Sources

EPA's second mass-based conversion approach is based on both historical emissions from existing sources (i.e., approach 1) and projected emissions from certain new, fossil fuel-fired electricity generation sources, particularly NGCC units.[15] The new units would be constructed to address the projected growth in electricity demand. In the proposed rule, and in a supplemental notice published in November 2014, EPA specifically asked for comments on whether and how new NGCC units could be addressed under its proposal.[16] EPA offered this second mass-based

[11] For more details, see CRS Report R43652, *State CO2 Emission Rate Goals in EPA's Proposed Rule for Existing Power Plants*, by Jonathan L. Ramseur.

[12] This information is available in EPA's supporting materials, at http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule.

[13] This information is available in EPA's supporting materials, at http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule.

[14] EPA points out that this step was not part of the June 2014 emission rate methodology. However, in a subsequent *Federal Register* notice, EPA asked for comments on approaches that would include such a step in the emission rate calculation. See discussion in U.S. EPA, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units," Notice of data availability, 79 *Federal Register* 64534, October 30, 2014.

[15] Other fossil fuel-fired units, including less efficient natural gas units, would likely not be able to meet the emission performance standards in EPA's proposal for new sources (U.S. EPA, "Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Generating Units," Proposed Rule, 79 *Federal Register* 1430, January 8, 2014). However, EPA contemplated new fossil fuel-fired units that use carbon capture and storage (CCS) technologies as another possibility.

[16] See U.S. EPA, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units," Proposed Rule, 79 *Federal Register* 34830, June 18, 2014, pages 34923-34924; and U.S. EPA, "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Generating Units," Notice, 79 *Federal Register* 67406, November 13, 2014.

approach to account for the possibility that new units may play a role in meeting a state's emission rate or mass-based target.

As with the first approach, the second approach involves a series of steps to produce the estimated electricity generation levels in future years. The following example describes how EPA estimated the states' 2029 electricity generation (from existing and new sources), and thus the 2030 emission targets:

i. EPA determined a state's projected sales of electricity in 2029 by multiplying a state's 2012 electricity retail sales (i.e., in-state) by a specific growth factor; EPA used growth factors for 21 different areas from the Energy Information Administration's (EIA) 2013 Annual Energy Outlook; **Figure 1** shows the different growth factors in each state;

ii. EPA calculated the incremental demand for new electricity in 2029 by multiplying a state's 2029 projected electricity by expected transmission losses,[17] and then subtracting projected generation from NGCC units that are under construction;[18]

iii. EPA combined the incremental demand in 2029 with the 2029 mass equivalent generation level from existing sources (calculated in approach 1); the resulting sum is the "mass equivalent generation level" for 2029 that includes existing and new sources.

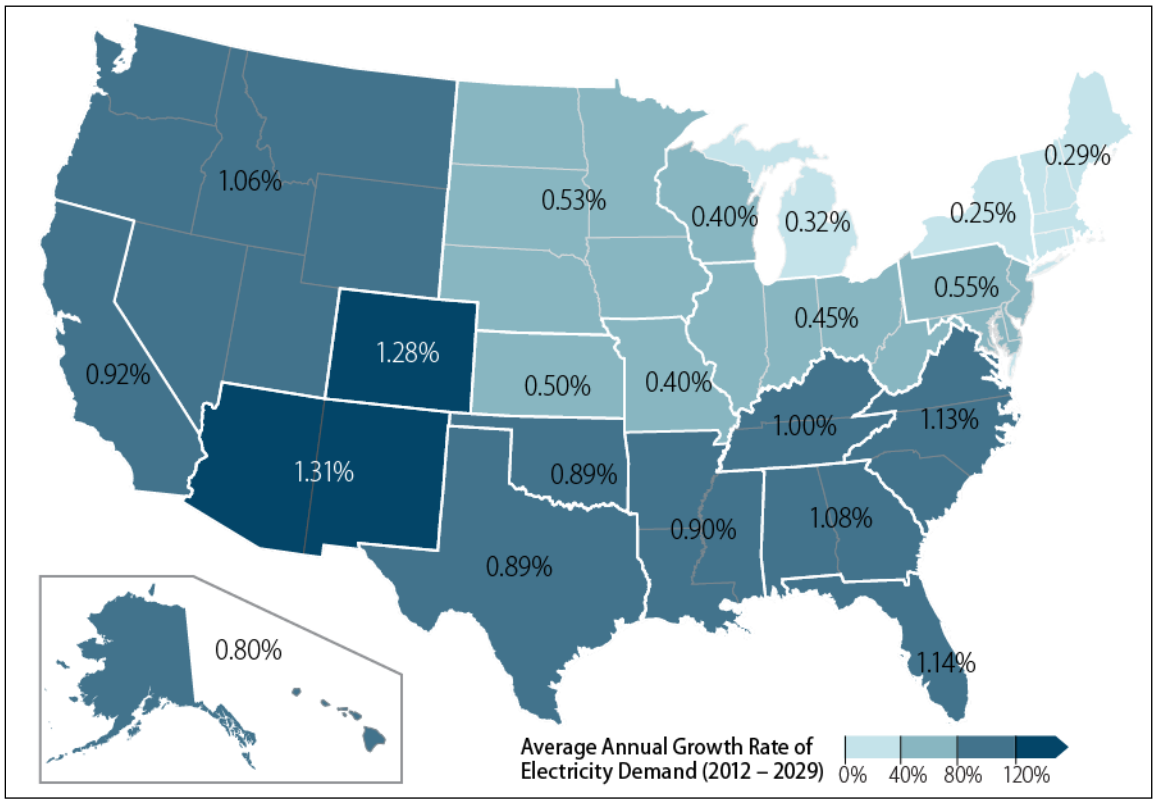
Similar to approach 1, EPA calculated the mass equivalent generation levels for each year between 2020 and 2029. EPA then multiplied these values by the corresponding emission rates to produce state-specific, mass-based, emission targets for each year. **Table 1** lists each state's 2012 CO_2 emission baseline, 2030 CO_2 emission target, and the percentage reduction required to meet the 2030 target.

[17] EPA assumes this to be a fixed percentage of 7.51% in each state. EPA also used this figure in its emission rate methodology for building block 4.

[18] EPA assumes that under-construction NGCC units will operate at 55% capacity.

Figure 1. EPA's Assumed Growth Factors in Electricity Demand by State

Annual Average Growth (2012 – 2029)



Source: Map prepared by CRS; source data from EPA technical support document spreadsheet ("Rate to Mass Translation Data File") at http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule-technical-documents#rate-to-mass.

Notes: EPA prepared annual average growth factors in electricity demand for each state, using Electricity Market Module (EMM) regional demand projections from the Energy Information Administration's 2013 Annual Energy Outlook. For states in multiple EMM regions (e.g., Virginia and Pennsylvania), EPA assigned the growth rate for the region that encompassed the largest portion of the state's territory. EPA assigned Alaska and Hawaii the average rate of the lower 48 states, because neither of these states is in an EMM region.

Observations About the Mass-Based Targets

Table 1 lists the state-specific, mass-based targets (2030) that EPA prepared using both approaches and compares these targets to each state's 2012 CO_2 emission baseline. In addition, **Table 1** provides the 2012 emission rate baseline, 2030 emission rate target, and the emission rate percentage reduction required between 2012 and 2030.

As with the emission rate reduction requirements, the mass-based reduction targets (calculated by EPA) vary by state. This section discusses some observations about the targets, how they compare with one another, and how they compare to emission rate targets.

Approach 1 (Existing Sources) vs. Emission Rate Targets

For the vast majority of states, the percentage reductions (between the 2012 baseline and 2030 targets) required by the emission rates match those required by the mass-based targets EPA

created using approach 1 (existing sources). However, in some cases the percentage reductions differ. The reasons for these differences vary.

In nine states—California, Colorado, Florida, Kentucky, Mississippi, North Carolina, Ohio, Virginia, and Wyoming—the mass-based targets for existing sources result in a smaller percentage reduction requirement from the 2012 baseline than the percentage reduction requirement for the emission rate target. The percentage reductions for these states are highlighted in blue in **Table 1**. The differences in percentage reductions range from 1% to 14%. For example, if Virginia were to use an emission rate target, its percentage reduction requirement would be 38% between 2012 and 2030. However, Virginia's mass-based target requires a 24% reduction during the same time period.

The reason for the percentage differences in these states relates to EPA's treatment of NGCC units that are under construction. These nine states are the only ones with NGCC units under construction. In EPA's mass-based conversion methodology, the agency includes under-construction NGCC units in the 2012 fossil fuel-fired generation baseline. However, in the emission rate methodology the generation from these units is not included in the 2012 baseline.[19] Thus, the baselines for these nine states are effectively higher using the mass-based methodology, and a relatively higher baseline yields a smaller reduction requirement.

Two other states—Washington and Idaho—also have lower percentage reduction requirements under the mass-based methodology. Their reduction percentages are highlighted in green in **Table 1**. These differences are the result of an adjustment EPA made to the states' "adjusted affected fossil fuel generation." As discussed above (step 2 in the mass-based methodology for existing sources), EPA calculates a state's "adjusted affected fossil fuel generation" by subtracting incremental renewable energy and energy efficiency values from a state's 2012 fossil fuel generation baseline. If EPA were to strictly apply this step for these states, the resulting values would be negative, an impossible outcome. If a negative value were allowed ("on paper") for the purposes of the calculations, these states' percentage reductions would match their emission rate percentage reductions. EPA adjusts the calculations in these states, by holding the "adjusted affected fossil fuel generation" at zero.

Four other states—Iowa, Maine, Minnesota, and South Dakota—have larger percentage reductions under the mass-based targets for the existing sources approach. The percentage reductions for these states are highlighted in orange in **Table 1**. The reason for these differences is due to the treatment of renewable energy (RE) in EPA's emission rate methodology, particularly its treatment in building block 3.[20]

In building block 3, EPA applies an annual growth rate[21] to each state's RE generation in 2012 to estimate annual RE generation for each state from 2017 through 2030. If the growth factor results in an individual state equaling or exceeding its 2030 RE target, the state's RE use is held constant at the level that matches its regional target. The 2012 RE generation in these four states matched or exceeded their 2030 RE targets, so the estimated future RE generation (for the purposes of the emission rate calculations) in these states actually *decreases* to match their regional targets.

[19] In the emission rate calculations, the generation from these units is not part of the 2012 baseline calculation, but comes into play during building block 2.

[20] For more details, see CRS Report R43652, *State CO2 Emission Rate Goals in EPA's Proposed Rule for Existing Power Plants*, by Jonathan L. Ramseur.

[21] To establish the growth rates, EPA placed each state into one of six regions (Alaska and Hawaii are treated individually). EPA then determined an RE 2030 target for each region based on an average of existing RE targets (e.g., renewable portfolio standards) that are required by some, but not all, states in the relevant region.

Arguably, this outcome artificially lowers the emission rate targets for these states. In the mass-based methodology, RE generation is captured in the target calculations, not in the 2012 baseline. Thus, in comparison to the emission rate reductions, the mass-based reductions in these states are greater.[22]

Approach 2 (Existing and New Sources)

EPA's second approach for converting to mass-based targets, which includes electricity generation from both existing and new sources, provides some results that may be of interest to policymakers and stakeholders. **Table 1** lists the state-specific 2012 emission baselines, 2030 emission targets, and their percentage changes. All of the states have lower percentage reduction requirements than those in approach 1 (existing sources only), because approach 2 includes projected increases of electricity generation. However, the range of percentage reduction requirements varies considerably. In particular, three states—California, Hawaii, and Idaho—have emission targets in 2030 that are higher than their 2012 baseline (highlighted in yellow in **Table 1**). Three other states—Alaska, Kentucky, and Virginia—have percentage reduction requirements that are 3% or less.

Several factors help explain the range of percentage reduction requirements that result from approach 2. First, as discussed above, the methodology in this approach uses a regional growth factor to project electricity demand in future years. These growth factors vary significantly—from 0.29% in the Northeast region to 1.31% in the Southwest region. Assuming these factors hold true, Arizona's demand for electricity will increase by 25% between 2012 and 2029. In contrast, the demand for electricity in Massachusetts will increase by 5% over the same time period.

Second, EPA uses electricity sales data in 2012 to calculate future electricity demand. The 2012 sales data include electricity generation from all sources, including hydroelectricity. This source of generation is included in EPA's emission rate methodology, but to a lesser extent than in the mass-based methodology.[23] The different accounting mechanisms appear to have an impact in states that generate a significant percentage of electricity generation from hydropower (e.g., Idaho, Washington, Oregon). Moreover, these three states are located in a region with a relatively high electricity growth factor (**Figure 1**).

Third, as with approach 1 (discussed above), the CO_2 emissions from NGCC units that are under construction are counted (at a 55% capacity rate) toward a state's 2012 baseline. This is a factor in nine states, particularly Virginia. In that state, under-construction NGCC units account for approximately 20% of the state's fossil-fuel fired generation in 2012, although these plants generated no power that year.

[22] For more details about EPA's renewable energy methodology, see CRS Report R43652, *State CO2 Emission Rate Goals in EPA's Proposed Rule for Existing Power Plants*, by Jonathan L. Ramseur.

[23] EPA accounts for hydropower generation in the building block 4 calculation (energy efficiency improvements) and at-risk and under-construction nuclear power generation in building block 3.

Table 1. EPA's Mass-Based Targets and Emission Rate Targets Compared to 2012 Baselines

State	Mass-Based Approaches					Emission Rate Approach		
	CO_2 Emission Baseline: Existing Sources (2012)	CO_2 Emission Target: Existing Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Target: Existing and New Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Rate Baseline (2012)	CO_2 Emission Rate Target (2030)	Percent Reduction from 2012 Baseline
	Thousand metric tons					Pounds per megawatt-hour		
	Approach 1			Approach 2				
Alabama	68,558	50,267	27%	59,214	14%	1,444	1,059	27%
Alaska	1,963	1,457	26%	1,912	3%	1,351	1,003	26%
Arizona	36,709	17,734	52%	24,193	34%	1,453	702	52%
Arkansas	36,095	20,096	44%	23,527	35%	1,634	910	44%
California	43,688	35,805	18%	45,171	(3%)	698	537	23%
Colorado	38,442	25,335	34%	31,935	17%	1,714	1,108	35%
Connecticut	6,038	4,265	29%	4,661	23%	765	540	29%
Delaware	4,363	2,972	32%	3,435	21%	1,234	841	32%
Florida	107,509	68,221	37%	83,259	23%	1,199	740	38%
Georgia	57,017	31,676	44%	42,394	26%	1,500	834	44%
Hawaii	4,729	4,010	15%	4,899	(4%)	1,540	1,306	15%
Idaho	638	468	27%	990	(55%)	339	228	33%
Illinois	87,133	58,471	33%	65,574	25%	1,894	1,271	33%
Indiana	91,831	73,090	20%	79,341	14%	1,924	1,531	20%

State	Mass-Based Approaches					Emission Rate Approach		
	CO_2 Emission Baseline: Existing Sources (2012)	CO_2 Emission Target: Existing Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Target: Existing and New Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Rate Baseline (2012)	CO_2 Emission Rate Target (2030)	Percent Reduction from 2012 Baseline
	Thousand metric tons					Pounds per megawatt-hour		
		Approach 1		Approach 2				
Iowa	34,674	25,749	26%	28,496	18%	1,552	1,301	16%
Kansas	31,156	24,081	23%	26,696	14%	1,940	1,499	23%
Kentucky	82,893	70,203	15%	81,953	1%	2,158	1,763	18%
Louisiana	44,186	26,823	39%	32,839	26%	1,455	883	39%
Maine	1,629	1,323	19%	1,432	12%	437	378	14%
Maryland	18,300	11,613	37%	15,148	17%	1,870	1,187	37%
Massachusetts	11,910	7,414	38%	8,204	31%	925	576	38%
Michigan	63,164	43,403	31%	46,725	26%	1,690	1,161	31%
Minnesota	25,416	14,474	43%	17,218	32%	1,470	873	41%
Mississippi	23,500	16,449	30%	18,916	20%	1,093	692	37%
Missouri	70,926	55,792	21%	60,173	15%	1,963	1,544	21%
Montana	16,266	12,828	21%	15,190	7%	2,246	1,771	21%
Nebraska	24,639	18,142	26%	20,233	18%	2,009	1,479	26%
Nevada	14,049	9,209	34%	11,396	19%	988	647	34%
New Hampshire	4,212	2,262	46%	2,392	43%	905	486	46%
New Jersey	11,774	6,741	43%	8,649	27%	928	531	43%

State	Mass-Based Approaches					Emission Rate Approach		
	CO_2 Emission Baseline: Existing Sources (2012)	CO_2 Emission Target: Existing Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Target: Existing and New Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Rate Baseline (2012)	CO_2 Emission Rate Target (2030)	Percent Reduction from 2012 Baseline
	Thousand metric tons					Pounds per megawatt-hour		
	Approach 1			Approach 2				
New Mexico	15,730	10,391	34%	13,337	15%	1,586	1,048	34%
New York	31,441	17,649	44%	19,310	39%	978	549	44%
North Carolina	53,169	36,918	31%	45,165	15%	1,647	992	40%
North Dakota	30,274	27,069	11%	28,270	7%	1,994	1,783	11%
Ohio	92,861	68,751	26%	75,116	19%	1,850	1,338	28%
Oklahoma	47,859	30,892	35%	35,127	27%	1,387	895	35%
Oregon	6,956	3,614	48%	5,293	24%	717	372	48%
Pennsylvania	105,184	72,272	31%	79,618	24%	1,531	1,052	31%
Rhode Island	3,389	2,924	14%	3,074	9%	907	782	14%
South Carolina	32,565	15,816	51%	22,014	32%	1,587	772	51%
South Dakota	3,018	1,602	47%	2,000	34%	1,135	741	35%
Tennessee	37,410	22,837	39%	32,992	12%	1,903	1,163	39%
Texas	220,740	135,937	38%	158,775	28%	1,284	791	38%
Utah	27,961	20,384	27%	24,165	14%	1,813	1,322	27%
Virginia	24,914	18,923	24%	24,494	2%	1,302	810	38%

State	Mass-Based Approaches					Emission Rate Approach		
	CO_2 Emission Baseline: Existing Sources (2012)	CO_2 Emission Target: Existing Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Target: Existing and New Sources (2030)	Percent Reduction from 2012 Baseline	CO_2 Emission Rate Baseline (2012)	CO_2 Emission Rate Target (2030)	Percent Reduction from 2012 Baseline
	Thousand metric tons					Pounds per megawatt-hour		
	Approach 1			Approach 2				
Washington	6,617	2,862	57%	4,772	28%	756	215	72%
West Virginia	65,614	52,636	20%	54,566	17%	2,019	1,620	20%
Wisconsin	38,390	25,275	34%	28,102	27%	1,827	1,203	34%
Wyoming	45,358	37,590	17%	39,550	13%	2,115	1,714	19%

Source: Prepared by CRS; emission rate and mass-based targets from EPA technical support documents and spreadsheets, at http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule.

Notes: This table lists the state-specific, mass-based targets (2030) that EPA prepared using both approaches and compares these targets to each state's 2012 CO_2 emission baseline. In addition, the table provides the 2012 emission rate baseline, 2030 emission rate target, and the emission rate percentage reduction required between 2012 and 2030. The colored boxes highlight differences between the comparisons:

Blue: in these nine states, the mass-based targets for existing sources (approach 1) result in a smaller percentage reduction requirement from the 2012 baseline than the percentage decrease for the emission rate target. The reason for the difference is EPA's treatment of under-construction NGCC units.

Green: in these two states, the mass-based targets for existing sources (approach 1) result in a smaller percentage decrease from the 2012 baseline than the percentage decrease for the emission rate target. The reason for the difference is due to a specific adjustment EPA made to these states' "adjusted affected fossil fuel generation."

Orange: in these four states, the mass-based targets for existing sources (approach 1) result in a larger percentage decrease from the 2012 baseline than the percentage decrease for the emission rate target. The reason for the difference reflects EPA's treatment of renewable energy, as discussed in the text.

Yellow: in these four states, the 2030 mass-based targets for existing and new sources (approach 2) are higher than the emissions in 2012. As discussed in the text, several factors may explain this result.

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